Guidelines for the management of **acute whiplash** associated disorders for health professionals.

3rd Edition 2014

NSW GOVERNMENT

Guidelines for the management of acute whiplash-associated disorders for health professionals, third edition 2014.

This document is endorsed by:

APS Australian Psychological Society

CAANSW Chiropractors' Association of Australia (NSW)

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION

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1 On 1 September 2015, the functions of the Motor Accidents Authority (MAA) were assumed by the State Insurance Regulatory Authority (SIRA).

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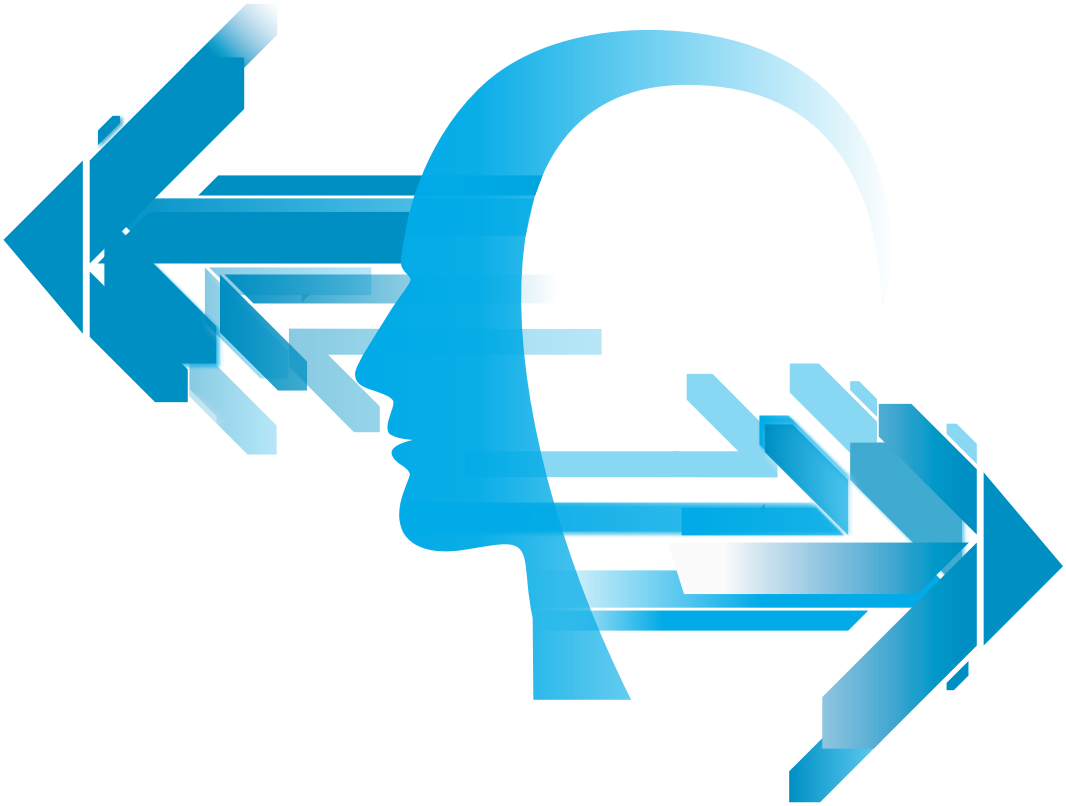


Working group members

Thank you to the members of the working group who guided this project.

The working group was established recognising that primary care health professionals, especially general practitioners, physiotherapists and chiropractors, manage most of the treatment arising from whiplash-associated disorders (WAD).

REPRESENTATIVE	POSITION	ORGANISATION	ROLE
Technical members			
Professor Ian Cameron*	Professor of Rehabilitation Medicine, University of Sydney	University of Sydney	Subject matter expert**
Associate Professor Lisa Harvey*	Associate Professor, University of Sydney	University of Sydney	Epidemiologist
Dr Joe Ierano*	President, Chiropractors' Asssociation of Australia (NSW Branch)	Chiropractors' Association Australia NSW Branch	Professional representative
Dr Jagnoor Jagnoor	Post-doctoral Fellow, University of Sydney	University of Sydney	Author
Dr Kathryn Nicholson Perry*	Senior Lecturer University of Western Sydney	Australian Psychological Society NSW Branch	Professional representative
Dr Trudy Rebbeck*	Specialist Musculoskeletal Physiotherapist	Australian Physiotherapy Association NSW Branch	Professional representative
Professor Michele Sterling*	NHMRC Research Fellow Associate Director Centre for National Research on Disability and Rehabilitation Medicine (CONROD)	University of Queensland	Subject matter expert**
Dr Clive Sun*	Consultant in Rehabilitation Medicine and Pain Medicine, St Vincent's Hospital	Australasian Faculty of Rehabilitation Medicine	Professional representative
Professor Simon Wilcock*	Professor and Head, Discipline of General Practice, Sydney Medical Program	University of Sydney	Subject matter expert**
Industry members			
Ms Katie Cooley	Rehabilitation Manager, Claims, QBE Insurance	Insurance Council of Australia	Industry representative
Ms Naomi Quinn	Senior Health and Road Safety Advisor, CTP Scheme Design Policy and Injury Prevention NRMA Insurance	Insurance Council of Australia	Industry representative
Regulator members			
Ms Tina Bidese	Acting Manager, Injury Strategy	Motor Accidents Authority (now SIRA)	Regulator representative
Ms Liz Gee	Senior Advisor, Injury Strategy	Motor Accidents Authority (now SIRA)	Chairperson, Regulator representative
Ms Penny Weiss	Injury Strategy Advisor, Injury Strategy	Motor Accidents Authority (now SIRA)	Regulator representative

* Denotes also a member of the scientific advisory committee.

** Appointed by the then MAA.

The working group provided a mechanism to consult with all relevant stakeholder groups, to reach consensus agreement and advise on necessary revisions of the *Guidelines for the management of acute whiplash-associated disorders second edition 2007* and associated documents.

The role of the working group was to:

- consider the recommendations of the systematic review, identify any additional areas, and provide recommendations for updating the Guidelines and associated documents
- provide advice on implementation of the revised Guidelines across relevant professional groups, CTP insurers and claimants with WAD.

The scientific advisory committee, a subcommittee of the working group, provided clinical and research expertise on the literature identified by the systematic review and other searches. Membership to the scientific advisory committee was determined at the first working group meeting. The scientific advisory committee reported back to the working group at each meeting.

At the commencement of the Guidelines development process, the working group members were asked to declare any conflict of interest, perceived or otherwise. There was no conflict of interest declared that had a material impact on the review of these Guidelines.

Preface

We developed new Guidelines for the management of whiplash-associated disorders (WAD), which is the single most frequently recorded injury among compulsory third party (CTP) claimants in NSW.

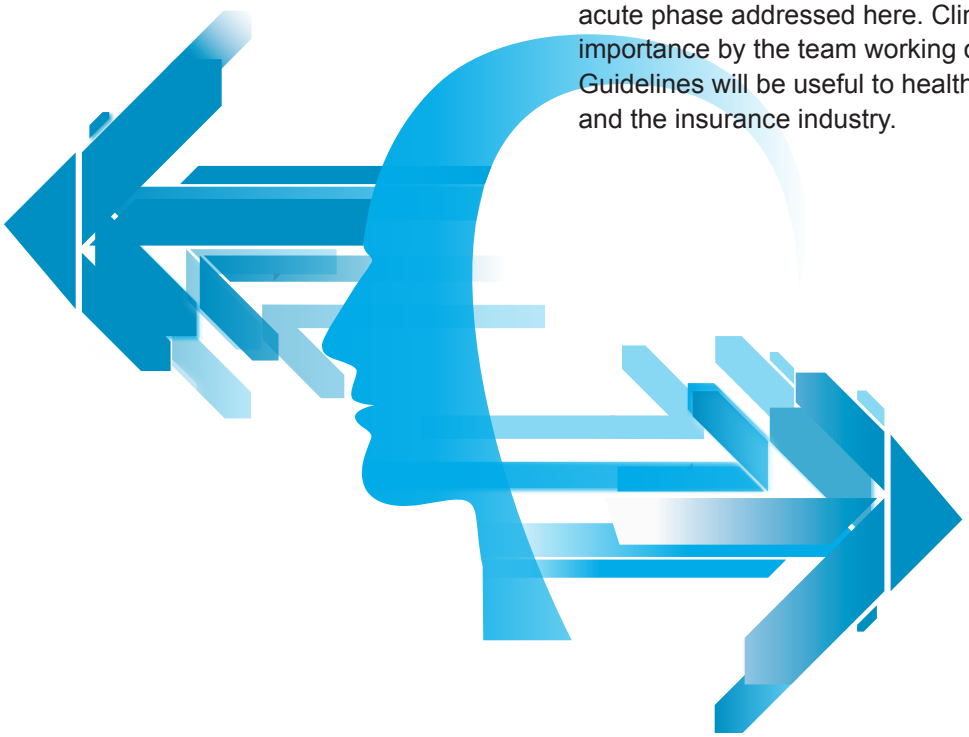
Of all the claims lodged since 2007, 46 per cent of claimants had WAD as one of their reported injuries. These Guidelines provide recommendations to health professionals, insurers and patients for the best possible management of adults with WAD in the first 12 weeks following a motor vehicle crash (MVC).

The first edition of the Guidelines was developed in 2001.[1] They were based on an update of the Quebec Task Force (QTF) guidelines, released in 1995[2] that reviewed 10,000 publications and focused on clinical issues, specifically risk, diagnosis, prognosis and treatment of WAD.

The second edition of the Guidelines was published in 2007.[3] A comprehensive review was undertaken using the MAA 2001 WAD Guidelines as a starting point. The aim was to systematically review and summarise relevant literature from 1999 to November 2005 on the assessment and diagnosis, the prognosis and the effectiveness of treatment in people with acute and subacute (less than 12 weeks' duration) WAD.

This third edition (2014) of the Guidelines includes more recently published evidence based recommendations for the management of acute WAD. A systematic review was undertaken to identify and summarise relevant literature from 2005 to July 2012. Recommendations for practice were developed by the working group on the basis of the current evidence. For areas of practice not adequately addressed by research, recommendations were developed based on expert consensus. A complete guide to the methods used can be found in the accompanying Technical Report.

These Guidelines cover the first 12 weeks following an MVC. However, they recognise that each person's experience of recovery is different and the natural course of the condition can go beyond the acute phase addressed here. Clinical utility has been given utmost importance by the team working on this project. We hope that these Guidelines will be useful to health professionals, people with WAD and the insurance industry.



Purpose of these Guidelines

These Guidelines are intended to assist health professionals delivering primary care to adults (18 years and beyond) with acute or subacute simple neck pain after an MVC in the context of CTP insurance.

The Guidelines specifically seek to assist health professionals to:

- conduct a comprehensive assessment and physical examination
- classify the WAD grade according to the QTF classification system
- apply the Canadian C-Spine rule to determine whether an X-ray is required to confirm the diagnosis of a fracture or dislocation
- consider the role of radiological imaging and special tests
- identify clinical and psychosocial risk factors
- inform and educate patients and emphasise the importance of staying positive and active
- review progress including physical and psychological status and take recommended action
- encourage coordinated care for improved health outcomes.

Definition

The QTF definition of WAD has been adopted as the definition of acute or subacute simple neck pain for the purposes of these Guidelines. It states:

> Whiplash is an acceleration-deceleration mechanism of energy transfer to the neck. It may result from … motor vehicle collisions … The impact may result in bony or soft tissue injuries (whiplash injury), which in turn may lead to a variety of clinical manifestations (Whiplash-Associated Disorders).[2]

Grades of WAD

The clinical classification of grades of WAD provided by the QTF is shown in the table below. Symptoms and disorders that can manifest in all grades include deafness, dizziness, tinnitus, headache, memory loss, dysphagia and temporomandibular joint pain.

Table 1: Quebec Task Force Classification of Grades of WAD

GRADE	CLASSIFICATION
0	No complaint about the neck. No physical sign(s).
I	Complaint of neck pain, stiffness or tenderness only. No physical sign(s).
II	Neck complaint AND musculoskeletal sign(s). Musculoskeletal signs include decreased range of movement and point tenderness.
III	Neck complaint AND neurological sign(s). Neurological signs include decreased or absent tendon reflexes, weakness and sensory deficits.
IV	Neck complaint AND fracture or dislocation.

Scope

The scope of the Guidelines covers WAD grades I, II and III in adults following an MVC. Grade IV is only considered to the extent of diagnosis of the condition and immediate referral to an emergency department or appropriate medical specialist.

These Guidelines are applicable in the first 12 weeks after an MVC regardless of whether WAD is the only injury or associated with other injuries. They also form the basis for treatment decisions beyond this initial 12-week period.

When to consult the Guidelines

The Guidelines are intended to guide GPs and health professionals in managing adults who present with neck pain after a recent MVC.

They will guide GPs and health professionals when:

- taking a patient history
- conducting an examination
- determining what, if any, investigations are required
- providing education and advice
- treating or referring a patient for treatment from other health professionals, such as physiotherapists and chiropractors; and reviewing progress.

In many cases, recovery from WAD occurs quickly. However, some adults with WAD will have persisting symptoms. To identify and deal with more complex cases the Guidelines recommend:

- educating primary health care professionals about adverse prognostic indicators which may indicate the need for more intensive treatment or early referral
- confirming that the diagnosis of a fracture or dislocation warrants immediate referral to an emergency department or a medical specialist
- providing indications of when generalist clinicians should refer patients to clinicians with specific expertise in WAD. This may include specialist physiotherapists, specialist chiropractors or musculoskeletal medicine practitioners. They may also include rehabilitation physicians, pain medicine specialists, psychologists and occupational physicians.

Intended users

The Guidelines are relevant for health professionals involved in primary care in NSW including:

- health professionals working in emergency departments
- general practitioners
- physiotherapists
- chiropractors
- psychologists.

First edition: 2001 Second edition: 2007 Third edition: 2014 Guidelines review date: 2019

Development of the Guidelines

The method for development of these Guidelines was guided by National Health and Medical Research Council (NHMRC) recommendations for the development of clinical practice guidelines. The WAD Guidelines published in 2007 were used as the starting point for the current review. Representatives from key organisations formed the working group. The development process is outlined in Table 2.

Table 2. Development process

PHASE OF GUIDELINE DEVELOPMENT PROCESS	ACTIVITY
Define the topic/issue for guideline	The third edition of the Guidelines is an update of the 2007 Guidelines. The key areas reviewed were assessment and diagnosis, prognosis and treatment.
Prepare the work plan Establish procedures and time frames; form the guidelines scientific advisory committee/ multidisciplinary committee (working group)	Formation of a working group with representation from key stakeholders, declaration of any conflict of interest, agreement on the process, meeting dates established.
Scoping/develop health care questions	Identification of key clinical areas and topics. Location and review of relevant existing Australian and international guidelines. Appraisal of these guidelines using the Appraisal of Guidelines Research and Evaluation (AGREE) Tool II.[4] Identification of clinical areas, which had already been adequately answered in existing guidelines. Formulation of clinical questions on WAD for the three key areas – presentation to and discussion about these with the working group.
Development phase	Contact was made to identify any state developments or publications that may have been relevant. Consultation with researchers and other experts within NSW and other states where relevant. Search of the literature for the research available. Appraisal (two appraisers) of the research literature and grading of the strength of the evidence. Discussion of the evidence and recommendations with the working group. Grading of the evidence in accordance with the NHMRC grades for recommendations.[5] Discussion with the working group, where there was limited literature available, to reach a consensus decision and recommendation. Editing of draft by medical editor.
Validation phase	Publication consultation and opportunity for feedback on the draft and formal endorsement by key stakeholder organisations.

Publication and dissemination	Publication and dissemination through email and website notices to key stakeholders and other organisations/individuals. Dissemination through key stakeholders. Documents and resources made available through our website. Proposed online training packages for key aspects of the Guidelines available on various websites.
Evaluation	To be determined at a future date following implementation.

The process

The aim of the current review was to comprehensively search for and identify gaps, and analyse new evidence regarding the management of WAD since the 2007 review. The quality of the new evidence was examined and the necessary refinements made to the existing Guidelines. The three key areas for review were:

- assessment and diagnosis
- prognosis
- treatment.

This is the third edition of the Guidelines for the management of acute whiplash-associated disorders and is an update of the second edition of the Guidelines, 2007.[3] A comprehensive search of appropriate electronic databases from 2005 to July 2012 was conducted using defined eligibility criteria for each of the three key areas. Bibliographies from identified papers and systematic reviews were searched recursively to identify any papers missed by the electronic search process. Papers were screened for inclusion by two independent reviewers and where necessary an external expert was consulted to determine whether any major studies had been missed. Included studies were critically appraised in terms of internal and external validity. The statistical and clinical relevance and applicability of results were determined utilising the NHMRC dimensions of evidence. Level of evidence reflects the best study types for the specific type of question (see Appendix 4, page 52).

Summary tables outline the details of included studies and their results. The grade of evidence was determined based on the NHMRC matrix as detailed in Table 3.

Table 3. Definition of NHMRC grades of recommendations

GRADE OF RECOMMENDATIONS	DESCRIPTION
A	Body of evidence can be trusted to guide practice.
B	Body of evidence can be trusted to guide practice in most situations.
C	Body of evidence provides some support for recommendation(s) but care should be taken in its application.
D	Body of evidence is weak and recommendation must be applied with caution.
Consensus ☑	A graded recommendation could not be made due to lack of evidence. Consensus recommendations are expressed as a clinical practice point ☑ which is supported by all members of the working group.

CONSENSUS GRADE OF RECOMMENDATION

The fifth and additional grade included for the purposes of the Guidelines for WAD was a consensus grade.

When limited literature was available, or the literature was of poor quality or entirely lacking, a consensus recommendation was developed by the working group.

Factors that contributed to the process of reaching a group consensus included:

- limitations of the literature that was available
- professional and practice knowledge/experience of working group members
- costs
- knowledge of the healthcare system and practice settings
- beliefs and values of the working group members.

The wording of consensus recommendations was formulated at the working group meeting and confirmation of each member's agreement was sought at the same time.

The tables and recommendations based on the systematic review were presented to the scientific advisory committee. This group examined the findings of the review process and discussed any modifications to the proposed Guidelines. Recommendations were presented to the full working group and agreed changes were incorporated into the final document. Each member of the working group was expected to consult with the group they were representing. Key messages for assessment, prognosis and treatment are reported with the highest level of evidence available to support the recommendation. Harms and benefits of each recommendation were considered by the working group. Consumers were consulted through a 'Survey on Consumer Guide' to get feedback on the content, clarity and presentation of the guide. There was a broad consultation of stakeholders to inform and develop implementation strategies for these Guidelines.

Any changes in the recommendation or level of evidence made to the 2007 Guidelines are indicated as in the key outlined in Table 4.

Table 4. Review and revision of recommendations

Unchanged	The new evidence is consistent with the relevant research used to make the original recommendation. The key recommendation in the original Guideline remains unchanged.
Changed	There is new evidence or change in the level of evidence. The key recommendation has been updated to reflect this change and the basis for change is reported.
New	New evidence leads to new recommendation.

Information specific to each area reviewed is discussed briefly on the next page.

Assessment and diagnosis

One of the primary difficulties in diagnosing WAD is that whiplash essentially describes a mechanism of injury. This mechanism of injury may, in turn, lead to a variety of clinical manifestations, the most common of which is neck pain.

In 1995, the QTF developed a classification system that was designed to improve the management of WAD by providing a guide to the signs and symptoms of whiplash indicative of the seriousness of the injury sustained (Table 1; page 4). This system has helped guide the assessment and diagnosis of WAD over the past 15 years. It is important that clinicians can identify signs and symptoms indicative of the various levels of severity of WAD so that appropriate management can be undertaken.

The review for the 'assessment and diagnosis' section aimed to evaluate appropriate tests or markers that are important in diagnosing and classifying people with acute WAD and to identify any procedures or markers that help differentiate patients with WAD from other populations (such as asymptomatic patients, or patients with neck pain of non-traumatic origin). Furthermore, the aim of assessment is to identify individuals with a good versus a poor prognosis.

Prognosis

A large number of prognostic studies have been undertaken for WAD in the past decade; however there remains considerable uncertainty regarding the course of the condition. Some studies report an uncomplicated recovery where pain and symptoms resolve quickly and completely. Other studies report ongoing and often debilitating symptoms in a large proportion of people with WAD.

Personal and societal factors have a large impact on the course of recovery and it is important to take these factors into account to ensure the appropriate allocation of health care, research and compensation. The prognosis section of the Guidelines will assist clinicians in identifying factors predictive of poor outcomes and provide a framework for early intervention.

Treatment

Randomised controlled trials (RCTs) were assessed for methodological quality using the PEDro scale.[6] Systematic reviews were scored for methodological quality using a modified AMSTAR guidelines checklist.[7] The treatment section will assist clinicians to appropriately manage the symptoms and signs to facilitate recovery for people with WAD.

Review of draft revised Guidelines

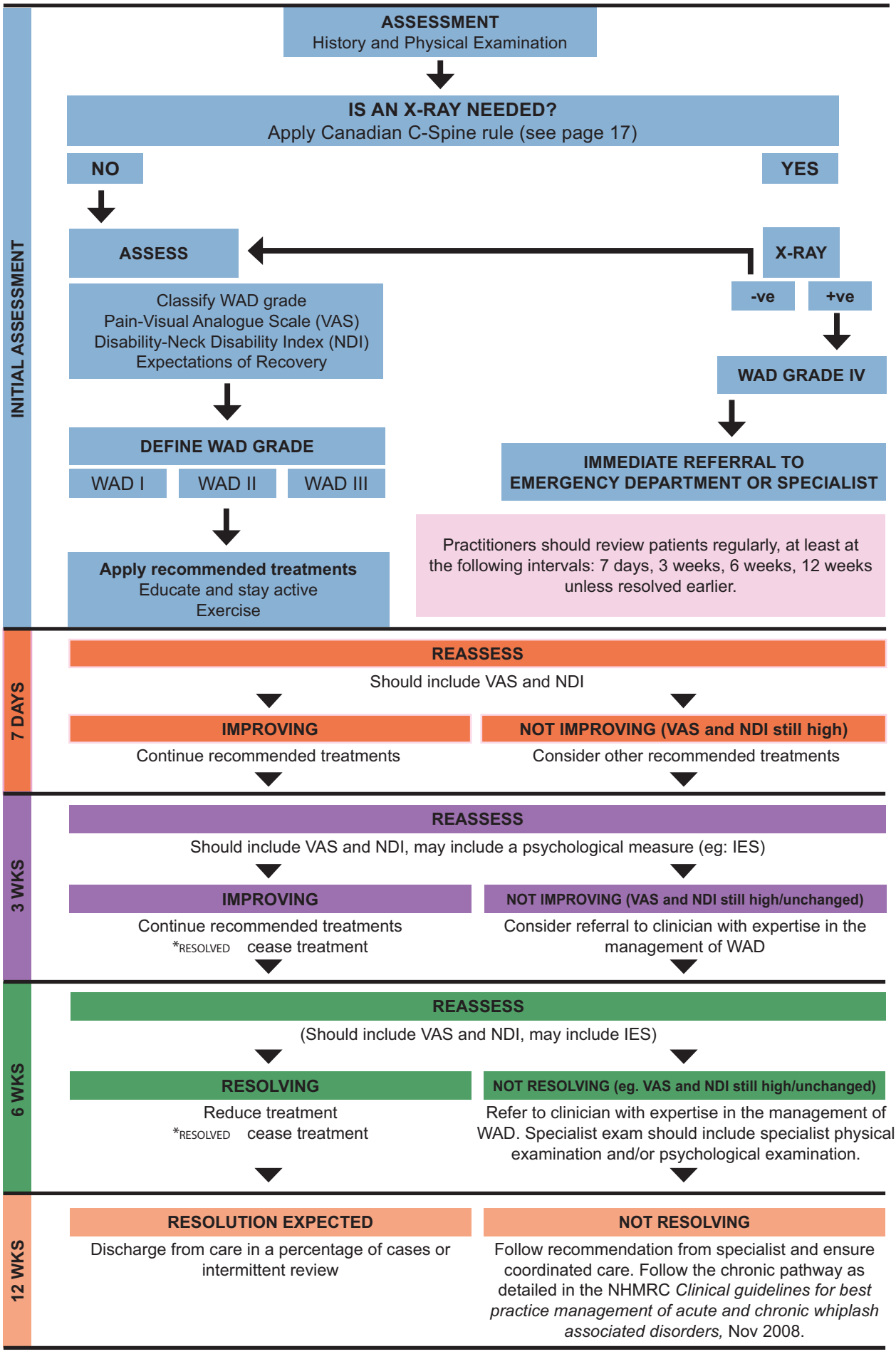
Stakeholder review was undertaken through the working group and when developing implementation strategies.

The draft clinical Guidelines were also reviewed by two external experts whose comments were considered by the working group and changes were incorporated into the Guidelines.

Consideration for implementation

The Guidelines working group identified key stakeholders who will have a major influence on the uptake of the Guidelines. For each of the stakeholder groups, the factors that may be potential barriers to implementing the Guidelines were identified. Implementation interventions that mitigate these potential barriers have been considered and will form the implementation plan. A suite of resources for people with WAD, professionals and insurers will be available on the website.

Figure 1:
Early management of whiplash-associated disorders



*Resolved is defined at VAS ≤3/10 and NDI <8/50

Notes to the flowchart

The flowchart provides a structure for the assessment and treatment of people with WAD during the first 12 weeks following injury. A glossary is available on page 38 of the Guidelines for the management of acute whiplash-associated disorders to assist with interpretation of technical terms and abbreviations. The flowchart offers a summary of how to apply the recommendations in the Guidelines. It is a guide only, as there will always be individual variations.

Initial assessment

Classify the WAD grade according to the QTF definition. The WAD grade provides a good indication of the severity of the injury. However, also look at the VAS and the NDI. These latter two factors are important because research indicates that they are better predictors of prognosis than the WAD grades. For example, a VAS score greater than 5/10 and an NDI score greater than 15/50 are associated with a poor prognosis. Patients' expectation of recovery should also be assessed. Expectation of recovery can be assessed by simply asking a patient, "Do you think you are going to get better soon?" Copies of the VAS and NDI and how to score them are available on the MAA website. The working group recommends assessing the VAS scale and the NDI at the seven-day review (see below) to identify WAD sufferers at risk of non-recovery. After the initial assessment recommended treatments should be commenced.

Review

Health professionals should review patients regularly, at least at the following intervals: seven days, three weeks, six weeks and three months (unless resolution has occurred earlier). Review should include reassessment of the VAS and the NDI. A patient is considered to have improved if there is at least a reduction of 10 per cent on these scales.[2]

Seven-day reassessment

Reassess using the VAS and NDI. If the VAS and NDI are high or unchanged, treatment type and intensity should be reviewed and other recommended treatment options should be considered. This may involve referral for physical therapy. The effectiveness of such treatments should be closely monitored and only continued if there is evidence of benefit (at least 10 per cent reduction in VAS and NDI).

Three-week reassessment

Reassess using the VAS and NDI. If the VAS and NDI are unchanged, a more complex assessment may need to be considered and treatment type and intensity should again be reviewed. The Impact of Event Scale (IES) may be used as a baseline for psychological assessment. If the VAS and NDI are unchanged, consider referral to a clinician with expertise in the management of WAD. This may include a specialist physiotherapist, specialist chiropractor, musculoskeletal medicine practitioner, rehabilitation physician, pain medicine specialist, psychologist or occupational physician. Amongst other things, if the VAS and NDI are unchanged, the clinician should undertake a more complex physical and/or psychological examination. The clinician should direct more appropriate care and liaise with the treating practitioner to ensure this is implemented. If the symptoms are resolving, treatment should be reduced.

Six-week reassessment

Reassess again at this point. There should be some resolution of symptoms in at least 40 per cent of cases. In these cases, treatment should be gradually withdrawn. If there is no resolution of symptoms, and the VAS and NDI have not changed by at least 10 per cent from the last review, the patient should be referred to a clinician with expertise in WAD. At this point, referral to a psychologist should also be considered. This is particularly important if the results of the psychological assessment indicate concern (IES score >25 at the six week reassessment).

12-week reassessment

Reassess again at this point. There should be complete resolution of symptoms in at least 40 per cent of cases. In these cases treatment should be ceased. If the patient is still improving, continue treatment with a focus on interventions which require active participation and independence (for example, provide patients with home exercise programs that involve active exercises). In these resolving cases, the patient should be reviewed intermittently over the next six to 12 months until resolution, to ensure home programs are maintaining improvement.

Coordinated care

Patients whose VAS and/or NDI scores are not improving at this point are likely to require coordinated multidisciplinary care. It is likely that a combination of physical, psychological and medical care is required. The primary health care professional should facilitate this process.

Summary of recommendations

This section summarises the recommendations for the clinical practice management of WAD. Complete details of the recommendations for assessment, prognosis and treatment of WAD are outlined in the 'recommendations for clinical practice' section (page 14 onwards).

Assessment and diagnosis

- Practitioners should take a history from the patient irrespective of the WAD grade.
- At each visit practitioners should conduct a focused physical examination.
- At the initial visit practitioners should use the Canadian C-Spine Rule to:
  - determine whether X-ray of the cervical spine is required for diagnosis of fracture or dislocation and to avoid unnecessary exposure to X-rays.
- At the initial visit practitioners should:
  - classify the WAD grade using the Quebec Task Force Classification (QTF)
  - assess pain using the Visual Analogue Scale (VAS)
  - assess disability using the Neck Disability Index (NDI).
- Do not use specialised imaging techniques, for example computed tomography (CT) scan, magnetic resonance imaging (MRI) in WAD grades I and II. Only use specialised imaging techniques for selected patients with WAD grade III, for example suspected nerve root compression or spinal cord injury.
- Do not use specialised examination techniques (for example EEG, EMG and specialised peripheral neurological tests) in patients with WAD grades I or II. Only use specialised examinations in selected patients with WAD grade III, for example patients with suspected nerve root compression.

Prognosis

- Provide more concerted treatment or consider earlier referral to a clinician with expertise in the management of WAD for patients with any of the following:
  - pain intensity (for example pain >5/10 on VAS scale)
  - disability related to neck pain (for example NDI >15/50).
- Reassure patients that changes (including degenerative or other minor pathological changes) on X-ray, MRI and CT are NOT associated with ongoing pain and disability following WAD.
- At the initial assessment, assess expectations of recovery by asking the patient "Do you think you are going to get better soon?" If the patient has a negative response, the patient should be monitored and if improvement/recovery does not occur by 3 to 6 weeks consider referral to a clinician with expertise in the management of WAD.
- Practitioners should screen for posttraumatic stress (PTS) symptoms using the Impact of Events Scale (IES), at 3 to 6 weeks post injury. This may help to identify the likelihood of ongoing pain and disability at 3 to 6 weeks post injury. Refer patients with IES scores >25 (indicating moderate levels of symptomatology) to a psychologist with expertise in the management of PTS symptoms.
- Practitioners should be aware that age, gender, marital status and education are NOT predictive of ongoing pain/disability.

Prognosis (continued)	• Practitioners should be aware that seat belt use, awareness of impending collision, position in vehicle and speed of collision are NOT predictive of ongoing pain/disability. • Practitioners should be aware that decreased initial neck range of motion and initial cold hyperalgesia are predictive of ongoing disability. When these findings are present, consider more concerted treatment or earlier referral to a clinician with expertise in the management of WAD. • Practitioners should be aware that pain or general physical health status prior to the collision is NOT predictive of ongoing pain/disability. • Practitioners should be aware that the relevance of compensation related factors in predicting outcome in WAD is inconclusive. • Practitioners should be aware that high health care utilisation for treatment of WAD is NOT predictive of ongoing pain and disability.
Recommended treatment in the first 12 weeks after injury	There is evidence that the intervention/treatment modalities listed are effective for the treatment of acute WAD. **They should be used as first line treatment for acute WAD.** • Reassure and stay active. • Return to usual activities. • Range of motion, low load isometric, postural endurance and strengthening exercises.
The Guidelines also provide information on:	• treatments not recommended • treatments not routinely recommended • treatments with no evidence for or against their use.

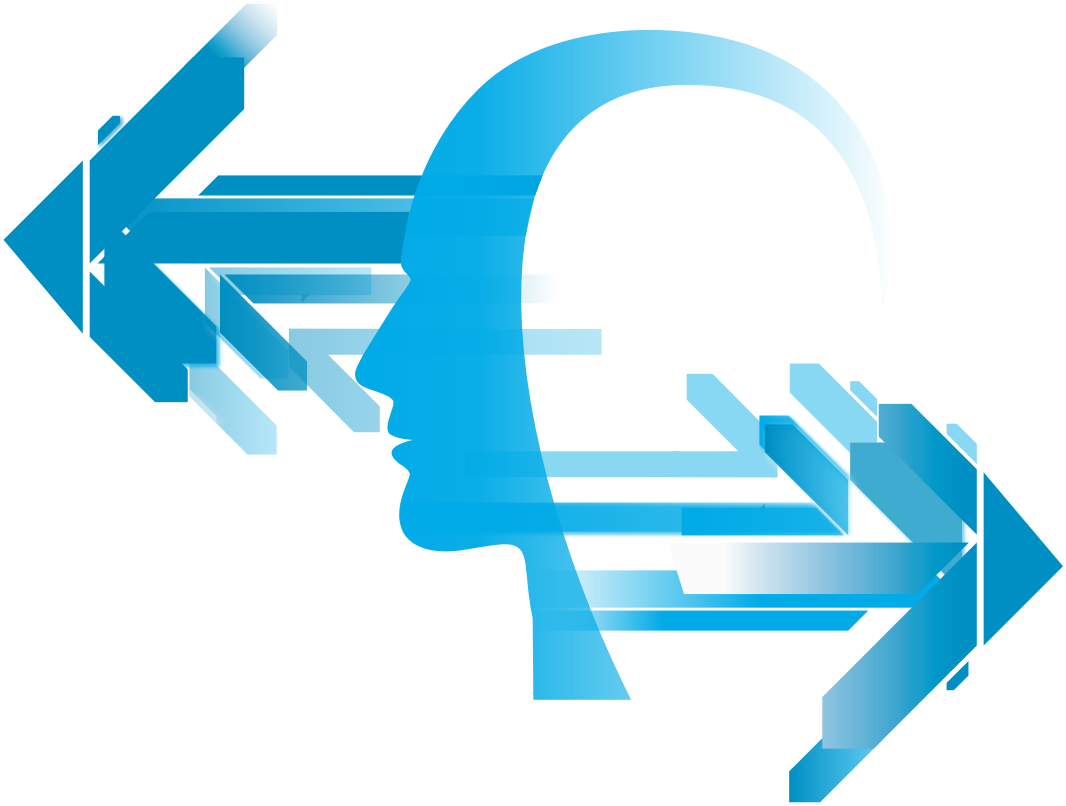
Recommendations for clinical practice

The recommendations for clinical practice are presented for assessment, prognosis and treatment of WAD, with the original recommendations from 2007 and an explanation of any change to the 2014 recommendations.

Additional evidence found by the literature review conducted on research published between 2005 and July 2012 has been summarised and the level of evidence provided by this research has been rated. Rating scales used to determine the level of evidence for recommendations are described in Appendix 4 (page 52).

The Technical Report provides further details of these studies and a complete bibliography. Prognostic indicators for WAD are summarised in Table 5 (page 25).

Changes to previous recommendations about the treatment of WAD are summarised in Table 6 (page 36).



Recommendations for assessment and diagnosis

TAKING PATIENT HISTORY	
A1. Recommendation	**Unchanged**
Level of evidence	**Consensus** ☑
At the initial visit, practitioners should take a history from the patient with WAD irrespective of the grade. At subsequent visits, practitioners should take note of changes or developments since the previous presentation and history.	

A patient's history should include information about:

- date of birth, sex and education level
- circumstances of injury, such as relevant crash factors that are related to the **Canadian C-Spine Rule** (see page 17)
- symptoms, particularly including pain intensity (ideally, using the **Visual Analogue Scale (VAS)** (see Appendix 2, page 40) or similar), stiffness, numbness, weakness and associated extra cervical symptoms. The localisation, time of onset and profile of onset should also be recorded for all symptoms
- expectation of recovery, which should be measured by asking the patient "**Do you think you are going to get better soon?**"[9]
- disability level, which should be measured using the **Neck Disability Index (NDI)** (see Appendix 2, pages 41–43). Such an assessment should be made at the initial consultation
- prior history of neck problems including previous WAD should be recorded.

Patients considered as having a poor expectation of recovery or a high expectation of ongoing disability may benefit from further assessment of psychological status at presentation.

Where appropriate, further assessment to determine psychological status may be undertaken at the three- or six-week review. The preferred tool is the Impact of Events Scale (IES), which is a validated tool. Other scales may be useful in some circumstances (see Technical Report for details).

History details should be recorded. A standardised form may be used.

PHYSICAL EXAMINATION

A2. Recommendation	Unchanged
Level of evidence	**Consensus ☑**

At each visit practitioners should conduct a focused physical examination including:

- observation (particularly of head position/posture)
- palpation for tender points
- assessment of range of motion (ROM) including flexion (chin to chest), extension, rotation and lateral flexion
- neurological testing
- assessment of associated injuries
- assessment of general medical condition(s), including psychological state (as appropriate).

A further, more specialised, physical examination might include assessment of cold hyperalgesia (refer to glossary, pages 38-39). A standardised form may be used.

PLAIN RADIOGRAPHS

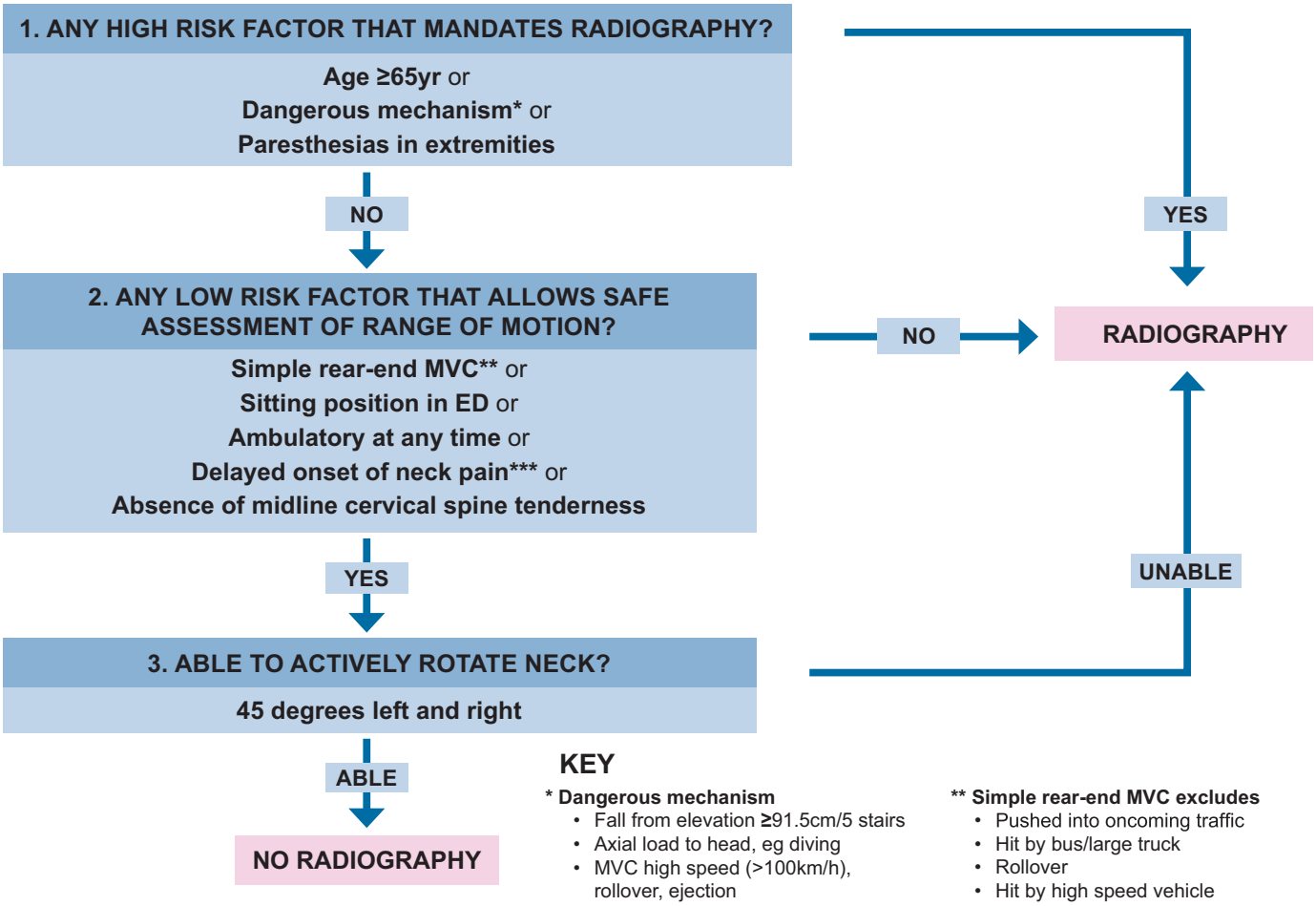
A3. Recommendation	Unchanged
Level of evidence	**A**

At the initial visit practitioners should use the Canadian C-Spine Rule[10] to:

- determine whether X-ray of the cervical spine is required for diagnosis of fracture or dislocation and to avoid unnecessary exposure to X-rays.

The Canadian C-Spine Rule

For alert (GCS score = 15) and stable trauma patients when cervical spine injury is a concern.



Instructions for using the Canadian C-Spine Rule

1. Define whether any high risk factors are present such as age (≥65 years) or dangerous mechanism (includes high speed or roll over or ejection, motorised recreation vehicle or bicycle crash). If this is the case, an X-ray of the cervical spine should be performed.
2. Define low risk factors that allow safe assessment of neck ROM. If the low risk factors shown in the flow chart are not present, an X-ray of the neck should be performed.
3. Assess rotation of the neck to 45 degrees in people who have low risk factors shown in the QTF Classification of Grades of WAD (Table 1, page 4). If people are able to rotate their neck to 45 degrees, they do not require an X-ray of the neck.

This rule has been validated across several different populations and has been shown to have a sensitivity of 99.4 per cent and a specificity of 42.5 per cent. Essentially, physicians who follow this rule can be assured that a fracture will not be missed (95% CI 98–100%).[10] Further a systematic review investigated the diagnostic accuracy of the Canadian C-Spine Rule and the National Emergency, X-Radiography Utilization Study (NEXUS) criteria and found that the Canadian C-Spine Rule had better accuracy.[11]

TOOLS FOR THE INITIAL ASSESSMENT

A4. Recommendation	Unchanged
Level of evidence	Consensus ☑

At the initial visit practitioners should:

- classify the WAD grade using the Quebec Task Force Classification (QTF) (see Table 1, page 4)
- assess pain using the Visual Analogue Scale (VAS)
- assess disability using the Neck Disability Index (NDI).

SPECIALISED IMAGING TECHNIQUES

A5. Recommendation	Unchanged
Level of evidence	Consensus ☑

WAD grades I and II

Do not use specialised imaging techniques, for example computed tomography (CT) scan, magnetic resonance imaging (MRI) in WAD grades I and II.

WAD grade III

Only use specialised imaging techniques for selected patients with WAD grade III, for example suspected nerve root compression or spinal cord injury.

SPECIALISED EXAMINATIONS

A6. Recommendation	Unchanged
Level of evidence	Consensus ☑

WAD grades I and II

Do not use specialised examination techniques (for example, EEG, EMG and specialised peripheral neurological tests) in patients with WAD grades I or II.

WAD grade III

Only use specialised examinations in selected patients with WAD grade III, for example, patients with suspected nerve root compression.

Recommendations for prognosis

SYMPTOMS	
P1. Recommendation	**Unchanged**
Level of evidence	**A**
Provide more concerted treatment or consider earlier referral to a clinician with expertise in the management of WAD for patients with any of the following: • pain intensity (for example pain >5/10 on VAS scale) • disability related to neck pain (for example NDI >15/50).	

New evidence since 2007 Guidelines

The 2014 recommendation is unchanged from the previous Guidelines; however, there is new robust evidence to support the recommendation. Three systematic reviews[12-14] (level I) and five cohort studies[15-20] (level II evidence, Appendix 4) have been published since 2005. There is strong evidence (four out of five high quality studies) that high initial pain intensity is associated with persistent neck pain and disability.

DIAGNOSTIC IMAGING	
P2. Recommendation	**Changed**
Level of evidence	**A**
Reassure patients that changes (including degenerative or other minor pathological changes) on X-ray, MRI and CT are NOT associated with ongoing pain and disability following WAD.	

2007 Guidelines

There is strong evidence that degenerative changes on X-ray are not associated with ongoing pain symptoms following WAD.

New evidence since 2007 Guidelines

Five cohort studies (level II)[20-24] and a systematic review (level I)[14] assessed the association of radiological changes with prognosis of pain and disability following WAD. None of the studies reported an association between changes on diagnostic imaging and ongoing pain and disability.

There is new evidence published for the prognostic relevance of CT scan and MRI.

Basis for change

Changes to the Guidelines reflect new evidence since the previous review.

PSYCHOLOGICAL FACTORS	
P3. Recommendation	**Changed**
Level of evidence	**A**
At the initial assessment, assess expectations of recovery by asking the patient "Do you think you are going to get better soon?" If the patient has a negative response, the patient should be monitored and if improvement/recovery does not occur by three to six weeks consider referral to a clinician with expertise in the management of WAD.	

PSYCHOLOGICAL FACTORS	
P4. Recommendation	**Changed**
Level of evidence	**A**
Practitioners should screen for posttraumatic stress (PTS) symptoms using the Impact of Events Scale (IES), at three to six weeks post injury. This may help to identify the likelihood of ongoing pain and disability at three to six weeks post injury. Refer patients with IES scores >25 (indicating moderate levels of symptomatology) to a psychologist with expertise in the management of PTS symptoms.	

2007 Guidelines

The relevance of psychosocial factors in predicting outcome in WAD is inconclusive. Poor prognosis is most likely to be associated with high initial pain intensity and high initial disability. However, where appropriate, psychosocial health may be assessed (preferably using the IES). If the IES score is greater than 26 (at six weeks after injury) psychological referral may be indicated.

New evidence since 2007 Guidelines

Since last review, eight cohort studies (level II)[16,17,20,25-31] have investigated the association of early posttraumatic stress symptoms and recovery following whiplash injury. All primary cohort studies found a positive association between posttraumatic stress symptoms and outcome.

Four cohort studies (level II; three cohorts with one expectation to return to work)[16,20,32,33] also reported that negative expectations of recovery were associated with ongoing neck pain and disability.

Basis for change

Changes made to the Guidelines reflect new evidence since the previous review.

SOCIO DEMOGRAPHIC FACTORS	
P5. Recommendation	**Changed**
Level of evidence	**Consensus ☑**
Practitioners should be aware that age, gender, marital status and education are NOT predictive of ongoing pain/ disability.	

2007 Guidelines

There is strong evidence that a limited educational level is associated with a poor outcome (ongoing disability).

There is strong evidence that poor outcome (ongoing pain) is not associated with age (up to 65 years), sex or marital status.

The evidence associating employment status with poor outcomes (ongoing pain symptoms) is inconclusive.

New evidence since 2007 Guidelines

There is grade A evidence based on three cohort studies[34-36] that age is not a predictor of poor recovery in terms of work disability in patients with WAD. Three cohort studies (level II)[15,19,37] have been published since the last review, reporting grade B evidence that age is predictive of non-recovery in terms of psychological injuries among people with WAD. There is inconsistent evidence, based on several cohort studies and two systematic reviews, that age is not associated with postraumatic stress or disability related to WAD.[12,13] There is additional evidence that age is also not associated with neck pain, widespread pain, stiffness, numbness in extremities, headaches and physiological symptoms.

Since 2005, several cohort studies[22,38,40-44] and two systematic reviews (level I)[12,13] have been published, examining the association between gender and recovery from WAD. However the evidence is very inconsistent. Based on the available evidence, clinical experience and expert opinion, gender is not predictive of ongoing pain and disability.

Based on three cohort studies (level II)[21,37,38] there is grade B evidence that marital status/living conditions are not associated with development of chronic WAD.

Eight cohort studies (level II)[15,16,21,37,38,40-42] and two systematic reviews (level I)[12,13] have been published since the last review. The evidence from these studies is inconsistent. Based on the available evidence, clinical experience and expert opinion, education level is not predictive of ongoing pain and disability.

Basis for change

Changes made to the Guidelines reflect the new evidence since the previous review. The recommendation outlines good clinical practice based on the consensus of an expert working group, and the best available evidence.

CRASH RELATED FACTORS	
P6. Recommendation	**Changed**
Level of evidence	**A**
Practitioners should be aware that seat belt use, awareness of impending collision, position in vehicle and speed of collision are NOT predictive of ongoing pain/disability.	

Other crash related factors were evaluated for their prognostic capacity.

Crash related factors that are **NOT PREDICTIVE** of poor recovery

Grade of evidence	Crash related factor
B	Head position at impact
B	Use of head restaints
B	Direction of impact
C	Airbag deployment

Crash related factors that are **PREDICTIVE** of poor recovery

Grade of evidence	Crash related factor
C	Self-rated collision severity

2007 Guidelines

The relevance of crash related factors in predicting outcome in whiplash injury is inconclusive.

New evidence since 2007 Guidelines

The recommendation is based on evidence that seat belt use (eight cohort studies, level II and two systematic reviews, level I),[12,13,15,20,21,25,38,39] speed of impact (four cohort studies level II and one systematic review, level I),[12,13,20,35,39,42] awareness of collision (three cohort, level II and two systematic reviews, level I)[12,13,15] seating position in the vehicles (six cohort studies, level II and two systematic reviews, level I)[12,13,15,21,22,39,41,43] are not associated with chronic pain or disability. Hence there is strong evidence that crash related factors do not predict outcomes in people with WAD.

Other crash related factors were also reviewed; however the grade of evidence varied. Recovery of WAD was not associated with head position at impact (one systematic review, level I; three cohort studies, level II).[12,15,20,44] Four of five cohort studies (level II) and two systematic reviews (level I)[12,13,15,20,21,39,43] reported that use of head restraints does not predict poor recovery in patients with WAD. Five of six cohort studies (level II)[15,17,20-22,37,41] and two systematic reviews (level I)[12,13] have reported that direction of impact is not associated with recovery from WAD. Airbag deployment does not predict poor recovery from WAD (two cohort studies, level II).[20,39]
Based on three cohort (level II)[22,39,45] studies, self-rated collision severity may predict poor health outcomes in people with WAD.

Basis for change

Changes to the Guidelines reflect new evidence since the previous review.

PHYSICAL IMPAIRMENT	
P7. Recommendation	**Unchanged**
Level of evidence	**A**
Practitioners should be aware that decreased initial neck range of motion and initial cold hyperalgesia are predictive of ongoing disability. When these findings are present, consider more concerted treatment or earlier referral to a clinician with expertise in the management of WAD.	

2007 Guidelines

Factors related to poor outcome (ongoing disability) include:

- hypersensitivity to specific cold sensitivity testing
- poor cervical ROM.

New evidence since 2007 Guidelines

The 2014 recommendation is unchanged from the previous Guidelines; however there is new robust evidence to support the recommendation. Since the last review six cohort studies and three systematic reviews have investigated the association of initial cervical range of motion to predict WAD related pain and disability.[12-14,21,26,28-30,34,45] There is grade A evidence that initial cervical range of motion does predict non-recovery (in terms of disability) in patients with WAD. There is grade B evidence that initial cervical range of motion does not predict non-recovery (in terms of pain) in patients with WAD.

There is grade A evidence that initial cold hyperalgesia is also predictive of non-recovery in terms of disability in people with WAD. Six cohorts studies (level II)[19,27-30,46] and three systematic reviews (level I)[12,14,47] have been published since 2005. Two of the three systematic reviews and four of the six cohort studies reported moderate evidence for cold hyperalgesia as a predictor of persistent disability following WAD.

PRIOR HISTORY/PREVIOUS SYMPTOMS	
P8. Recommendation	**Changed**
Level of evidence	**Consensus ☑**
Practitioners should be aware that pain or general physical health status prior to the collision is NOT predictive of ongoing pain/disability.	

2007 Guidelines

There is moderate evidence that previous neck pain is not associated with poor outcomes in patients with WAD in terms of ongoing pain symptoms. However, previous neck pain may be associated with poor outcome in terms of ongoing disability.

New evidence since 2007 Guidelines

There has been new research investigating the association of pre-collision factors like pain, general health, medication use and psychological factors with the outcome of WAD.

There is grade B evidence based on eight cohort studies (level II)[16,21,36,39,41,42,48,49] and two systematic reviews (level I)[12,13] that pre-collision neck pain does not predict non-recovery in patients with WAD. There is grade A evidence based on eight primary cohort studies (level II)[16,17,21,37-39, 42,48], seven of which concluded that there is no significant association with various measures of self-reported pre-collision general health and WAD outcomes.

Basis for change

The recommendation outlines good clinical practice based on the consensus of an expert working group and the best available evidence.

COMPENSATION	
P9. Recommendation	**Unchanged**
Level of evidence	**Consensus ☑**
Practitioners should be aware that the relevance of compensation related factors in predicting outcome in WAD is inconclusive.	

2007 Guidelines

The relevance of compensation factors in predicting outcome in WAD is inconclusive.

New evidence since 2007 Guidelines

The 2014 recommendation is unchanged from the previous Guidelines. Since 2005, six cohort studies have been published reporting the association between compensation and outcome for WAD recovery.[21,29,36,38,39,50] The evidence for compensation related factors predicating WAD outcomes is inconsistent. Equal number of studies reported for and against predictive capacity of compensation status.

HEALTH CARE UTILISATION	
P10. Recommendation	**Changed**
Level of evidence	**Consensus ☑**
Practitioners should be aware that high health care utilisation for treatment of WAD is NOT predictive of ongoing pain and disability.	

2007 Guidelines

The evidence that high utilisation of treatment predicts ongoing (pain) symptoms in patients with WAD is inconclusive, and evidence that high utilisation of treatment predicts ongoing disability in patients with WAD is limited.

Basis for change

The recommendation outlines good clinical practice based on the consensus of an expert working group, and the best available evidence. Table 5 summarises the prognostic indicators that are relevant to acute and subacute WAD (see Technical Report for further details).

Table 5. Summary of prognostic indicators relevant to acute and subacute WAD

The table below provides a summary of prognostic indicators that are relevant to acute and subacute WAD and the strength of available evidence. Health professionals should use this information to identify adults at risk of non-recovery.

Factors PREDICTIVE of poor recovery

FACTOR	OUTCOME/S	STRENGTH OF EVIDENCE
SYMPTOMS		
Higher initial neck pain levels	Ongoing pain	A
	Ongoing disability	A
	Ongoing psychological symptoms	B
	Work disability	C
	Other (like muscle function)	D
Higher initial disability	Ongoing disability	A
Self-perceived injury severity	Ongoing pain/disability	B
Headache	Ongoing pain/disability	D
Higher number of symptoms	Ongoing pain/disability	C
WAD grade	Ongoing pain/disability	C
Back pain	Ongoing pain/disability	C
Dizziness	Ongoing pain/disability	C
PSYCHOLOGICAL		
Posttraumatic stress symptoms	Ongoing pain/disability	A
Negative expectation of recovery	Ongoing pain/disability	A
Somatisation	Ongoing pain/disability	B
Depression	Ongoing pain/disability	C
Pain catastrophising	Ongoing pain/disability	C
Coping strategies	Ongoing pain/disability	D
CRASH RELATED		
Self-rated collision severity	Ongoing pain/disability	C
DEMOGRAPHICS		
Age	Ongoing psychological symptoms	B
PHYSICAL		
Cervical range of motion	Ongoing disability	A
Cold hyperalgesia	Ongoing disability	A
PRE-COLLISION		
Pre-collision bodily pain	Ongoing pain/disability	B
Pre-collision psychological health	Ongoing pain/disability	C

*Strength of evidence as defined by the NHMRC grades of recommendations (Table 3, page 7).

Factors NOT PREDICTIVE of poor recovery

FACTOR	OUTCOME/S	STRENGTH OF EVIDENCE
SYMPTOMS		
Shoulder pain	Ongoing pain/disability	A
PSYCHOLOGICAL		
Kinesiophobia (fear of movement)	Ongoing pain/disability	C
Anxiety	Ongoing pain/disability	D
CRASH RELATED		
Seat belt use	Ongoing pain/disability	A
Awareness of collision	Ongoing pain/disability	A
Position in vehicle	Ongoing pain/disability	A
Speed of collision	Ongoing pain/disability	A
Head position at impact	Ongoing pain/disability	B
Use of head restraints	Ongoing pain/disability	B
Direction of impact	Ongoing pain/disability	B
Airbag deployment	Ongoing pain/disability	C
RADIOLOGICAL FINDINGS		
Radiological findings	Ongoing pain/disability	A
DEMOGRAPHICS		
Age	Ongoing pain	B
	Work disability	A
Living situation	Ongoing pain/disability	B
Work status	Ongoing pain/disability	C
Income	Ongoing pain/disability	C
PHYSICAL		
Lower pressure pain thresholds	Ongoing pain/disability	A
Motor/sensory-motor dysfunction	Ongoing pain/disability	A
BMI	Ongoing pain/disability	B
Cervical range of motion	Ongoing pain/disability	B
Sympathetic vasoconstriction	Ongoing pain/disability	B
PRE-COLLISION		
Pre-collision neck pain	Ongoing pain/disability	B
Pre-collision headache	Ongoing pain/disability	B
Pre-collision general health	Ongoing pain/disability	B
Pre-collision medication use	Ongoing pain/disability	B

Factors WITH INCONSISTENT evidence

(equal numbers of studies both for and against predictive capacity):

FACTOR
Gender
Educational evidence
Self-perceived general health
Compensation related factors

Recommendations for treatment

Recommended

There is evidence that the intervention/treatment modalities listed in this section **are effective** for the treatment of acute WAD. **Therefore they should be used as first line treatment for acute WAD**.

REASSURE AND STAY ACTIVE	
T1. Recommendation	**Unchanged**
Level of evidence	**B**

Practitioners should advise patients to stay active to optimise recovery from acute WAD.

Practitioners should acknowledge that the patient is hurt and has symptoms, and advise that:

- symptoms are a normal reaction to being hurt
- maintaining normal life activities is an important factor in getting better
- staying active is important in the recovery process
- voluntary restriction of activity may cause delayed recovery
- it is important to focus on improvements in function.

2007 Guidelines

The recommendation was that the practitioner should acknowledge that the patient is hurt and has symptoms, reassure and advise to remain active.

Basis for change

The recommendation is unchanged; however there is stronger evidence to support the recommendation. Changes made to the Guidelines reflect new evidence since the previous review.[51]

EXERCISE	
T2. Recommendation	**Changed**
Level of evidence	**B**

Practitioners should advise patients that exercise is effective for the management of acute WAD.

Practitioners should provide neck specific exercises such as range of motion, low load isometric, postural endurance and strengthening exercises.

2007 Guidelines

ROM and muscle re-education exercise to restore appropriate muscle control and support to the cervical region in patients with WAD should be implemented immediately, if necessary in combination with intermittent rest when pain is severe. Clinical judgement is crucial if symptoms are aggravated by exercise.

New evidence since 2007 Guidelines

There are five new RCTs (level II)[52-56] and six systematic reviews (level I)[58-62] reporting an active physical regime including exercise results in enhanced pain reduction and shortening of post-injury disability. The primary RCTs utilised a range of exercise approaches including range of motion, cervical muscle endurance, stabilisation, co-ordination, cervical muscle strengthening, McKenzie method and functional capacity exercises.

To assist clinicians and their patients, examples of these exercises are provided in Appendix 3, pages 45-51.

Basis for change

New grade B evidence is available to support the use of active exercises and active physical therapy in combination with other therapy to improve outcomes in patients with WAD. Changes made to the Guidelines reflect new evidence since the previous review.

PHARMACOLOGY

T3. Recommendation	Changed
Level of evidence	**Consensus ☑**

Practitioners should discuss the use of pain relieving medications and prescribe as follows:

Simple analgesics – Paracetamol

Regular paracetamol may be used as first line treatment for acute WAD.

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)

If regular paracetamol is ineffective, NSAIDs may be used for the treatment of acute WAD.

Opioid analgesics

Oral opioids, preferably short-acting agents at regular intervals, may be necessary to relieve severe pain in the treatment of acute WAD. Ongoing need for such treatment requires reassessment.

2007 Guidelines

WAD grade I – no medication other than simple analgesics should be prescribed.

WAD grades II and III – non-opioid analgesics and NSAIDs can be used to alleviate pain in the short term. Their use should be limited to three weeks and should be weighed up against known side-effects, which appear to be dose related.

Opioid analgesics are not recommended for patients with WAD grade I. They may be prescribed for pain relief in patients with acute WAD grades II and III experiencing severe pain (VAS >8) for a limited period of time.

Psychopharmacologic drugs are not recommended in patients with acute and subacute WAD of any grade. However, they can be used occasionally for symptoms such as insomnia or tension or as an adjunct to activating interventions in the acute phase.

New evidence since 2007 Guidelines

There is no new evidence since the last review.

Basis for change

The recommendations were made on the basis of consensus of the working group with reference to Australia and New Zealand College of Anaesthetics and Faculty of Pain Management. The recommendations made below are consistent with the *Acute pain and management: scientific evidence,* third edition 2010.[63]

Not routinely recommended

Evidence for the efficacy of the interventions/treatment modalities listed in this section is limited. Therefore, treatments described in the 'recommended' section above are preferred. Practitioners who choose to use the 'not routinely recommended' treatments described below should closely monitor the effectiveness of these treatments in each patient.

Treatment should only be continued if there is evidence of benefit (at least 10 per cent improvement on VAS and NDI as per the early management of whiplash-associated disorders flowchart).

MANUAL THERAPY	
T4. Recommendation	**New**
Level of evidence	**C**
Practitioners may provide manual therapy* as it may be effective for the treatment of acute WAD.	

* Refer to glossary on pages 38-39.

Basis for change

Based on systematic review by Teasell and colleagues[58] there is evidence that manual therapy may provide some benefit in the management of acute WAD.

MANIPULATION	
T5. Recommendation	**Changed**
Level of evidence	**C**
Practitioners may provide thoracic manipulation* for the treatment of acute WAD. However, thoracic manipulations should only be provided by registered health practitioners trained in the specific methods and in accordance with current professional standards. There is no evidence for the efficacy of cervical manipulation in the treatment of acute WAD.	

* Refer to glossary on pages 38-39.

2007 Guidelines

A regime of manipulation should only be given to patients with WAD in combination with manual and physical therapies and exercise, provided there is evidence of continuing measurable improvement. This technique should be restricted to registered health practitioners trained in the specific methods and in accordance with current professional standards. WAD grade III (decreased or absent tendon reflexes and/or weakness and sensory deficit) is a relative contraindication for manipulation.

New evidence since 2007 Guidelines

Based on a small RCT (level II)[64] and three systematic reviews (level II)[58,61,65] there is grade C evidence that thoracic manipulation may be effective in the treatment of acute WAD. Further high quality RCTs are required before manipulation would be routinely recommended for the treatment of WAD.

Basis for change

Changes made to the Guidelines reflect new evidence since the previous review.

ACUPUNCTURE	
T6. Recommendation	**Changed**
Level of evidence	**D**
Practitioners should note that acupuncture is ineffective for the treatment of acute WAD.	

2007 Guidelines

A regime of acupuncture should only be given to patients with WAD in combination with manual and physical therapies and exercise, provided there is evidence of continuing measurable improvement.

New evidence since 2007 Guidelines

Based on two systematic reviews (level I)[57,60] and a randomised trial (level II)[66], laser acupuncture appears to be ineffective in the management of acute WAD.

Basis for change

Changes made to the Guidelines reflect new evidence since the previous review.

KINESIO TAPING	
T7. Recommendation	**New**
Level of evidence	**C**
Practitioners should note Kinesio taping may be effective in the treatment of acute WAD.	

New evidence since 2007 Guidelines

An RCT (level I)[67] reports Kinesio taping with proper tension exhibited statistically significant improvements immediately following application of the tape and at 24-hour follow-up.

Basis for change

Changes made to the Guidelines reflect new evidence since the previous review.

TRIGGER POINT NEEDLING	
T8. Recommendation	**New**
Level of evidence	**D**
Practitioners should note that trigger point needling may be effective in the treatment of acute WAD.	

New evidence since 2007 Guidelines

There has been a small RCT (level II)[68] reporting feasibility and clinical relevance of needling of muscle trigger points.

Basis for change

Changes made to the Guidelines reflect new evidence since the previous review.

SURGICAL TREATMENT	
T9. Recommendation	**Unchanged**
Level of evidence	**Consensus ☑**
Practitioners should note that surgical intervention is not recommended **except** in rare patients with WAD grade III with persistent arm pain consistent with cervical radiculopathy (supported by appropriate investigations) that does not respond to conservative management, or with rapidly progressing neurological deficit.	

No evidence

Other treatments where there is no evidence for or against their use.

Since 2005 no RCTs have been conducted on the treatment/interventions listed below. There is no evidence for or against the efficacy of their use for the treatment of acute WAD. Therefore, treatments described in the 'recommended' section above are preferred.

Practitioners who choose to use the treatments/interventions listed below should closely monitor their effectiveness in each patient.

Treatment should only be continued if there is evidence of benefit (at least 10 per cent changes on VAS and NDI as per the early management of whiplash-associated disorders flowchart).

Treatments where there is no evidence for or against	
T10. Recommendation	**Unchanged**
Level of evidence	**Consensus ☑**

Practitioners should note the following interventions may be applied for short periods, and in conjunction with other evidence based treatments provided there is evidence of continuing measurable improvement (at least 10 per cent change on VAS and NDI).

- Traction
- Pilates
- Feldenkrais
- Alexander technique
- Massage
- Homeopathy*
- Cervical pillows
- Magnetic necklaces
- Spray and Stretch
- Heat
- Ice
- Transcutaneous electrical nerve stimulation (TENS)
- Electrical stimulation
- Ultrasound
- Laser
- Shortwave diathermy

* At the time of finalising the Guidelines, the NHMRC published an information paper for public consultation reviewing the efficacy of homeopathy: *NHMRC draft information paper: evidence on the effectiveness of homeopathy for treating health conditions,* April 2014, http://consultations.nhmrc.gov.au/public_consultations/homeopathy_health, accessed 26 June 2014.

2007 Guidelines

Traction and cervical pillows were "not routinely recommended" treatments in the 2007 Guidelines. Cervical pillows, spray and stretch, magnetic necklaces, Pilates, Feldenkrais, Alexander technique and massage were "not recommended" treatment in the previous Guidelines.

Basis for change

The working group determined the above treatments should be addressed as a separate entity for the revised Guidelines.

Not recommended

There is evidence that the intervention/treatment modalities listed in this section are **not effective** for the treatment of acute WAD. **Therefore, they should NOT be used.**

REDUCTION OF USUAL ACTIVITIES	
T11. Recommendation	**Unchanged**
Level of evidence	**Consensus ☑**
Patients with WAD should be advised that reduction of usual activities for more than four days is NOT recommended in treatment of WAD.	

Basis for change

The recommendation has not changed, however the working group determined that the recommendation should be addressed as 'Reduction of usual activity' in place of 'Immobilisation-prescribed rest'. The recommendation outlines good clinical practice based on the consensus of an expert working group, and the best available evidence.

IMMOBILISATION – COLLARS	
T12. Recommendation	**Changed**
Level of evidence	**A**
Practitioners should not prescribe collars as they are ineffective and should NOT be used in the treatment of acute WAD. Active treatment is more beneficial as per recommendation T1.	

2007 Guidelines

Collars should not be prescribed for patients with WAD. If they are prescribed, they should not be used for more than 48 hours.

New evidence since 2007 Guidelines

Two randomised controlled trials (level II)[51,69] and two new systematic reviews (level I)[57,59] have been published since last review. These studies have found that collars are not effective for recovery in patients with acute WAD.

Basis for change

Changes made to the Guidelines reflect new evidence since the previous review.

PHARMACOLOGY	
T13. Recommendation	**New**
Level of evidence	**Consensus ☑**
Practitioners should NOT prescribe adjunctive agents such as anti-convulsants and anti-depressants as they are ineffective in the treatment of acute WAD.	

New evidence since 2007 Guidelines

There is no new evidence since the last review.

Basis for change

The recommendation outlines good clinical practice based on the consensus of an expert working group, and the best available evidence.

MUSCLE RELAXANTS	
T14. Recommendation	**Changed**
Level of evidence	**B**
Practitioners should NOT prescribe muscle relaxants as they are ineffective in treatment of acute WAD.	

2007 Guidelines

Muscle relaxants should not generally be used in patients with acute or subacute phase WAD.

New evidence since 2007 Guidelines

There is new evidence based on an RCT (level II)[70] that centrally acting muscle relaxants do not provide any additional benefit than NSAIDs alone.

Basis for change

Changes made to the Guidelines reflect new evidence since the previous review.

BOTULINUM TOXIN TYPE A	
T15. Recommendation	**Changed**
Level of evidence	**A**
Practitioners should NOT prescribe Botulinum toxin type A as it is ineffective in the treatment of acute WAD.	

New evidence since 2007 Guidelines

A randomised controlled trial (level II)[71] and a systematic review (level I)[58] report that use of Botulinum toxin type A showed no improvements in outcome measures in the management of WAD.

Basis for change

Changes made to the Guidelines reflect new evidence since the previous review.

INJECTIONS – STEROID INJECTIONS

T16. Recommendation	Unchanged
Level of evidence	**Consensus ☑**

Practitioners should not prescribe:

- intra-articular steroid injections as they are not recommended for patients with acute WAD
- epidural steroid injections as they are not recommended for patients with WAD grades I or II. Occasionally, patients with WAD grade III who have unresolved radicular pain that has persisted for more than one month might benefit from epidural steroid injections
- steroid trigger point injections as they are not recommended in the acute phase
- intrathecal steroid injections as they are not recommended for all patients with WAD.

Basis for change

The recommendation outlines good clinical practice based on the consensus of an expert working group, and the best available evidence.

PULSED ELECTROMAGNETIC TREATMENT (PEMT)

T17. Recommendation	Changed
Level of evidence	**Consensus ☑**

Practitioners should not prescribe PEMT as there is no evidence of efficacy for PEMT for acute WAD.
PEMT is not recommended as it involves wearing a collar for eight hours per day for 12 weeks which conflicts with grade A evidence that collars are ineffective and should not be used in the treatment of acute WAD.

2007 Guidelines

WAD grade I: PEMT is not recommended because it involves wearing a soft collar eight hours per day for 12 weeks.

WAD grades II and III: during the first three weeks the other professionally administered passive modalities/ electrotherapies are optional adjuncts to manual and physical therapies and exercise, with emphasis on return to usual activity as soon as possible.

New evidence since 2007 Guidelines

There has been no new evidence since last review.

Basis for change

The recommendation outlines good clinical practice based on the consensus of an expert working group, and the best available evidence.

Table 6. Summary of changes to recommended treatments since previous Guidelines

Table 6 below summarises the changes in the 2014 recommended treatments in comparison with those in the 2007 Guidelines. Table 7 lists the level of evidence available (based on NHMRC levels – see Appendix 4) for the treatments which have been considered.

PREVIOUS GUIDELINES (2007)	RECOMMENDATIONS FOR NEW GUIDELINES (2014)
RECOMMENDED TREATMENTS	
• Reassure/act as usual • Return to usual activity, work alteration • Exercise – ROM* exercises, muscle re-education • Pharmacology – simple analgesics	• Reassure and stay active • Return to usual activites • Exercise – ROM* exercises, low load isometric, postural endurance and strengthening exercises • Pharmacology – simple analgesics, NSAIDs*, opioid analgesics
NOT ROUTINELY RECOMMENDED TREATMENTS	
• Passive joint mobilisation • Manipulation • Traction • Postural advice • Multimodal treatment • Acupuncture • Passive modalities/electrotherapies • Surgical treatment • Pharmacology – NSAIDs* and strong analgesics	• Manual therapy • Thoracic manipulation • Acupuncture • Kinesio taping • Trigger point needling • Surgical treatment
NO EVIDENCE – TREATMENTS WHERE THERE IS NO EVIDENCE FOR OR AGAINST THEIR USE	
Several of the listed treatments were not recommended in the 2007 Guidelines. The working group acknowledges that there is no evidence **for or against** the listed treatments and hence this new section has been included in the 2014 Guidelines.	• Traction • Pilates • Feldenkrais • Alexander technique • Massage • Homeopathy • Cervical pillows • Magnetic necklaces • Spray and stretch • Heat • Ice • Transcutaneous electrical nerve stimulation (TENS) • Electrical stimulation • Ultrasound • Laser • Shortwave diathermy
TREATMENTS NOT RECOMMENDED	
• Cervical pillows • Spray and stretch • Intra-articular and intrathecal steroid injections • Magnetic necklaces • Other interventions, for example pilates, massage etc.	• Reduction of usual activities • Immobilisation – collars • Pharmacology – anti-convulsants, anti-depressants • Muscle relaxants • Botulinum toxin type A • Injections – steroid injections • Pulsed Electromagnetic Treatment (PEMT)

* ROM = range of motion; NSAIDs = non-steroidal anti-inflammatory drugs.

Table 7. Grade of evidence for treatments used for acute WAD

INTERVENTIONS	GRADE OF RECOMMENDATION (REFER TO TABLE 3)
EVIDENCE OF BENEFIT – RECOMMENDED	
Advise patients to stay active to optimise recovery.	B
Advise patients that exercise is effective.	B
Simple analgesics may be used as first line treatment for pain relief.	☑
NSAIDs may be used if simple analgesics are ineffective.	☑
Oral opioids may be necessary to relieve severe pain. Ongoing need for such treatment requires reassessment.	☑
LIMITED EVIDENCE – NOT ROUTINELY RECOMMENDED	
Manual therapy may be effective.	C
Thoracic manipulation may be effective.	C
Acupuncture is ineffective.	D
Kinesio taping may be effective.	C
Trigger point needling may be effective.	D
Surgical intervention is not recommended except in rare patients.	☑
NO EVIDENCE OF BENEFIT OR HARM Recommended for short period in conjunction with evidence based treatment only in case of significant improvement.	
Traction, pilates, Feldenkrais, Alexander technique, massage, homeopathy, cervical pillows, magnetic necklaces, spray and stretch, heat, ice, transcutaneous electrical nerve stimulation (TENS), electrical stimulation, ultrasound, laser, shortwave diathermy	☑
EVIDENCE OF NO BENEFIT – NOT RECOMMENDED	
Reduction of usual activities for more than four days is not recommended.	☑
Collars are ineffective and should not be used.	A
Adjunct agents such as anti-convulsants and anti-depressants are ineffective and should not be prescribed.	☑
Muscle relaxants are ineffective and should not be prescribed.	B
Botulinum toxin type A is ineffective and should not be prescribed.	A
Intra-articular and intrathecal steroid injections should not be prescribed.	☑
PEMT should not be prescribed.	☑

☑ Consensus: a graded recommendation could not be made due to lack of evidence. Consensus recommendations are expressed as a clinical practice point '☑' which is supported by all members of the working group.

Appendix 1. Glossary

Adverse prognostic indicators	Factors that have been associated with adverse outcomes.
Cervical pillows	Commercially made contoured pillows.
Cold hyperalgesia	Cold hyperalgesia could be assessed. In research environment/ studies cold hyperalgesia in people with WAD has been identified by increased cold pain thresholds (CPT) and early presence of cold hyperalgesia is a predictor of poor physical and mental health outcomes. CPT is usually measured using laboratory equipment that lowers the temperature over an area of skin until both cold and pain are felt. The expense of these devices precludes their clinical use. Sensation of pain and time to pain on application of ice to the skin have been suggested as appropriate clinical alternative to identify cold hyperalgesia, however this method needs further validation.
Consensus	Majority view of all members of the working group. The basis for recommendations in the absence of evidence.
Exercise	May be either a direction to increase activity or a prescription for a specific set of exercises.
IES	Impact of Events Scale.
Immobilisation	To prevent motion of the neck, usually by application of a cervical collar.
Manipulation	A technique of treatment applied to joints for the relief of pain and improvement of motion. It is a single high velocity, low amplitude movement applied passively to the joint towards the limit of its available range.
Manual and physical therapies	Methods of treatment (for example manipulative and exercise therapy) used in the rehabilitation of persons with musculoskeletal disorders. They are non-invasive, non-pharmaceutical methods of treatment.
Manual therapy	Manual therapy consists of a range of interventions, including hands-on techniques such as joint mobilisation. Such techniques are usually low velocity and low amplitude movements.
MVA	Motor vehicle accident.
MVC	Motor vehicle collision.
NDI	Neck Disability Index.
NSAIDs	Non-steroidal anti-inflammatory drug(s).
Passive joint mobilsation	A technique of treatment applied to joints for the relief of pain and improvement of motion. Mobilisation is the passive application of repetitive, rhythmical, low velocity, small amplitude movements to the joint within or at the limit of its available range.
Passive modalities	Electrotherapeutic agents that are applied for the relief of pain and assisting the resolution of the inflammatory response. They are administered passively to the patient.

PEMT	Pulsed electromagnetic treatment.
Postural advice	Specific instructions on posture.
QTF	Quebec Task Force.
RCT	Randomised controlled trial.
ROM	Range of motion.
Soft collars	Foam neck supports.
Specialised examinations	Specialised tests that are not routinely performed as part of a physical examination and that often require specialised testing equipment. These include EEG, EMG and specialised peripheral neurological tests.
Specialised imaging techniques	All radiological techniques except plain film radiology.
Spray and stretch	Techniques where a coolant spray is applied to a painful area as a precursor to stretching.
TENS	Transcutaneous electrical nerve stimulation, a non-invasive low frequency electrical stimulation that is applied through the skin with the aim of introducing an afferent barrage to decrease the perception of pain.
Traction	A passive, longitudinal force of a vertebral segment that can be applied manually or mechanically with the aim of inducing subtle vertebral distraction for duration of the procedure.
VAS	Visual Analogue Scale.
Whiplash-associated disorders (WAD)	Whiplash is an acceleration-deceleration mechanism of energy transfer to the neck. It may result from motor vehicle collisions, the impact of which may result in bony or soft tissue injuries, which in turn may lead to a variety of clinical manifestations.
Work alteration	Modification of work duties and/or work environment to accommodate an injured worker.

Appendix 2.
Outcome measures for the assessment of WAD

Visual Analogue Scale (VAS) for pain

The VAS[72] for pain consists of a 10cm line with two end-points representing ‘no pain’ and ‘pain as bad as it could possibly be’. Patients with WAD are asked to rate their pain by placing a mark on the line corresponding to their current level of pain. The distance along the line from the ‘no pain’ marker is then measured with a ruler giving a pain score out of 10.

The Neck Disability Index (NDI)

The NDI[73] (see pages 42 to 43) is designed to measure neck-specific disability and is based on the Oswestry Disability Questionnaire.[74] The questionnaire has 10 items concerning pain and activities of daily living including personal care, lifting, reading, headaches, concentration, work status, driving, sleeping and recreation. Each item is scored out of 5 (with the 'no disability' response given a score of 0) giving a total score for the questionnaire out of 50. Higher scores represent greater disability. The result can be expressed as a percentage or as raw scores (out of 50). The NDI is translated into other languages.

In these Guidelines, use of the raw score is recommended.

Impact of Event Scale (IES)

The IES (see page 44) was developed by Horowitz, Wilner and Alvarez to measure current subjective distress related to a specific event.[75] The IES is a self-report measure of posttraumatic disturbance and is very widely used. The scale is reproduced with permission of the author.

SCORING METHOD	Each item is scored:
Not at all	**0**
Rarely	**1**
Sometimes	**3**
Often	**5**

The item scores are summed. A total score of 25 or more, at three to six weeks after injury is in the 'moderate' range. A score of >43 is 'severe'.

Neck Disability Index

Instructions

This questionnaire has been designed to give your health professional information as to how your neck pain has affected your ability to manage in everyday life. Please answer every section and mark only the ONE box in each section which applies to you. We realise you may consider that two of the statements in any one section relate to you, but please just mark the box which most closely describes your problem.

Section 1 – Pain intensity	☐ I have no pain at the moment. ☐ The pain is very mild at the moment. ☐ The pain is moderate at the moment. ☐ The pain is fairly severe at the moment. ☐ The pain is very severe at the moment. ☐ The pain is the worst imaginable at the moment.
Section 2 – Personal care (washing, dressing etc.)	☐ I can look after myself normally without causing extra pain. ☐ I can look after myself normally but it causes extra pain. ☐ It is painful to look after myself and I am slow and careful. ☐ I need some help but manage most of my personal care. ☐ I need help every day in most aspects of my self care. ☐ I do not get dressed, I wash with difficulty and stay in bed.
Section 3 – Lifting	☐ I can lift heavy weights without extra pain. ☐ I can lift heavy weights but it gives extra pain. ☐ Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example on a table. ☐ Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned. ☐ I can lift very light weights. ☐ I cannot lift or carry anything at all.
Section 4 – Reading	☐ I can read as much as I want to with no pain in my neck. ☐ I can read as much as I want to with slight pain in my neck. ☐ I can read as much as I want to with moderate pain in my neck. ☐ I cannot read as much as I want because of moderate pain in my neck. ☐ I can hardly read at all because of severe pain in my neck. ☐ I cannot read at all.
Section 5 – Headaches	☐ I have no headaches at all. ☐ I have slight headaches, which come infrequently. ☐ I have moderate headaches which come infrequently. ☐ I have moderate headaches which come frequently. ☐ I have severe headaches which come frequently. ☐ I have headaches almost all the time.

Section 6 – Concentration	☐ I can concentrate fully when I want to with no difficulty. ☐ I can concentrate fully when I want to with slight difficulty. ☐ I have a fair degree of difficulty in concentrating when I want to. ☐ I have a lot of difficulty in concentrating when I want to. ☐ I have a great deal of difficulty in concentrating when I want to. ☐ I cannot concentrate at all.
Section 7 – Work	☐ I can do as much work as I want to. ☐ I can only do my usual work, but no more. ☐ I can do most of my usual work, but no more. ☐ I cannot do my usual work. ☐ I can hardly do any work at all. ☐ I cannot do any work at all.
Section 8 – Driving	☐ I can drive my car without any neck pain. ☐ I can drive my car as long as I want with slight pain in my neck. ☐ I can drive my car as long as I want with moderate pain in my neck. ☐ I cannot drive my car as long as I want because of moderate pain in my neck. ☐ I can hardly drive at all because of severe pain in my neck. ☐ I cannot drive my car at all.
Section 9 – Sleeping	☐ I have no trouble sleeping. ☐ My sleep is slightly disturbed (less than 1 hr sleepless). ☐ My sleep is mildly disturbed (1-2 hrs sleepless). ☐ My sleep is moderately disturbed (2-3 hrs sleepless). ☐ My sleep is greatly disturbed (3-5 hrs sleepless). ☐ My sleep is completely disturbed (5-7 hrs sleepless).
Section 10 – Recreation	☐ I am able to engage in all my recreation activities with no neck pain at all. ☐ I am able to engage in all my recreation activities, with some pain in my neck. ☐ I am able to engage in most, but not all, of my usual recreational activities because of pain in my neck. ☐ I am able to engage in a few of my usual recreational activities because of pain in my neck. ☐ I can hardly do any recreation activities because of pain in my neck. ☐ I cannot do any recreation activities at all.

Impact of Event Scale (IES)

On _____ you experienced a motor vehicle accident.

Below is a list of comments made by people after stressful life events. Please check each item, indicating how frequently these comments were true for you DURING THE PAST SEVEN DAYS. If they did not occur during that time please mark the 'NOT AT ALL' column.

	NOT AT ALL	RARELY	SOMETIMES	OTHER
1. I thought about it when I didn't mean to.				
2. I avoided letting myself get upset when I thought about it or was reminded of it.				
3. I tried to remove it from memory.				
4. I had trouble falling asleep or staying asleep because pictures or thoughts about it came into my mind.				
5. I had waves of strong feelings about it.				
6. I had dreams about it.				
7. I stayed away from reminders about it.				
8. I felt as if it hadn't happened or it wasn't real.				
9. I tried not to talk about it.				
10. Pictures about it popped into my mind.				
11. Other things kept making me think about it.				
12. I was aware that I still had a lot of feelings about it but I didn't deal with them.				
13. I tried not to think about it.				
14. Any reminder brought back feelings about it.				
15. My feelings were kind of numb.				

Appendix 3.
Examples of neck exercises

The following exercises can be used as a guide by practitioners when providing primary care to people with WAD. The exercises are designed to restore the movement and muscle control around your neck and to reduce unnecessary postural strain and muscle pain.

When you are performing the exercises, stop and contact your doctor or therapist if you notice:

- dizziness, light headedness, blurred vision, fainting or disorientation
- sudden pain shooting down your arm, or numbness or weakness in your arm or hand
- unusually severe neck pain, and/or
- that exercises consistently produce a headache, which persists.

For each exercise:

- move smoothly and slowly, without sudden jerks; the key is precision and control
- keep your mouth and jaw relaxed; keep your lips together, teeth slightly apart and let your tongue rest on the roof of your mouth
- gently hold your shoulders back and down so that they are relaxed while you are doing all exercises (see posture correction exercise, exercise 4, below)
- in movement exercises, try to move the same distance to each side. If one side is stiffer, move gently into the stiffness. Move to that direction a little more often
- expect some discomfort, but remember exercises should not cause severe pain.

Neck exercises while lying down

Lie down with a soft pillow under your neck, and with your knees bent up.

1. The chin nod exercise

Gently and slowly nod your head forward as if to say ‘yes’.

Feel the muscles at the front of your neck.

Stop the nodding action just before you feel the front muscles hardening.

Hold the nod position for five seconds and then relax.

Gently move your head back to the normal start position

Repeat up to 10 times.

2. Head rotation

Gently turn your head from one side to the other.

Look where you are going.

Progressively aim to turn your head far enough so your chin is in line with your shoulder and you can see the wall in line with your shoulder.

Repeat 10 times to each side.

3. Shoulder blade exercise

This exercise will relax and ease any tension in the muscles on top of your shoulders and it will give you pain relief.

a. Lie on your right side with your arm resting up on two pillows.

b. Roll your left shoulder blade back and across your ribs towards the centre of your back.

   Hold the position for 10 seconds.

Repeat five times.

Repeat lying on the left side for the right shoulder blade.

Exercises while sitting

4. Correct postural position

Correct your posture regularly by gently straightening up your lower back and pelvis (sit tall).

Now gently draw your shoulder blades back and down.

Gently tuck your chin in. Hold the position with ease for at least 10 seconds.

This position will prevent and ease muscle pain and tension in your neck and shoulder muscles.

Repeat the correction regularly, every half hour during the day.

You can do this exercise at work, in the car, on a train or bus and sitting at home.

5. Neck retraction

a. Sit in the correct postural position described in exercise 4.

b. Gently draw your head back, sliding your chin back horizontally and keeping your nose pointing straight ahead. You should feel the retraction movement at the base of your neck and your neck should stay long.

Repeat this 10 times every hour when sitting.

Neck movement exercises

Sit in the correct postural position as described in exercise 4.

6. Rotation

Gently turn your head from one side to the other.

Look where you are going, progressively aim to see the wall in line with your shoulder.

This exercise is similar to the exercise you did lying down, only this time you do it sitting.

Repeat 10 times.

7. Side bending

Gently tilt your head towards your shoulder and feel the gentle stretch in the muscles on the side of your neck.

Perform the movement to both sides.

Repeat 10 times.

8. Bending and extension

Gently bend your head towards your chest.

Lead the movement with your chin.

Moving the chin first, bring your head back to the upright position and gently roll it back to look up towards the ceiling.

Leading with your chin, return your head to the upright position.

Repeat 10 times.

Neck strengthening (exercises 9 to 11) should only be started later in your recovery. If you are unsure when to begin this, ask your treating health professional.

9. Neck strengthening exercises (isometric, no movement exercise)

Sit in the correct postural position as described in exercise 4.

Make sure your chin is relaxed and slightly down.

Place your right hand on your right cheek.

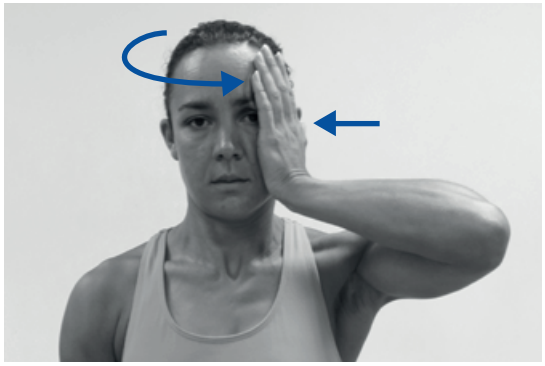
Gently try to turn your head into your fingers to look over your right shoulder but allow no movement.

Hold the contraction for five seconds.

Use a 10 per cent to 20 per cent effort, no more!

Repeat with the left hand on the left cheek.

Do five repetitions of the holding exercise to each side.



Neck strengthening exercises whilst in the safe four-point kneeling position.

Firstly, adopt the four-point kneeling position.

Begin by ensuring your knees are directly under your hips, and your hands directly under your shoulders.

Your lower back should be in a neutral position; that is, with a natural arch.

Gently draw your belly button to your spine (10 per cent effort).

Push gently through your shoulder blades, so that your upper back is level.

Draw your shoulders gently away from your ears, or toward your hips.

Lift your head up so that it is level with your shoulders, but maintaining a gentle chin tucked or nod position.

Once you can hold the safe four-point kneeling position, proceed with the neck movement exercises as described below.

10. Neck bending and extension in the four-point kneeling position

a. Adopt the safe four-point kneeling position.

b. Slowly look up toward the ceiling as far as you can go. Hold for 5 to 10 seconds.

c. Follow this by slowly bending your neck, leading the movement with a chin tuck or nodding action.

   Continue the neck bending movement as far as possible, aim for your chin to touch your chest.

   Throughout this movement you should hold the neutral lower back and shoulder blade posture described above.

   Perform 5 to 10 repetitions.

11. Neck rotation in the four-point kneeling position

Adopt the safe four-point kneeling position.

Slowly rotate your head (turn your neck to one side).

It is important to maintain the gentle chin tuck or ‘nod’ position throughout the movement.

Also, make sure your head stays level with your body, and does not drop down.

If you do this exercise correctly, you should be looking over your shoulder at the end of the movement.

It helps to do this exercise positioning yourself side-on to a mirror so that you can check your head position.

Repeat to the other side.

Perform 5 to 10 repetitions.

Appendix 4.
NHMRC evidence hierarchy: designations of 'levels of evidence' according to type of research question

Level	Intervention	Diagnostic accuracy	Prognosis	Aetiology	Screening intervention
I	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies
II	A randomised controlled trial	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation	A prospective cohort study	A prospective cohort study	A randomised controlled trial
III-1	A pseudorandomised controlled trial (i.e. alternate allocation or some other method)	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among non-consecutive persons with a defined clinical presentation	All or none	All or none	A pseudorandomised controlled trial (i.e. alternate allocation or some other method)
III-2	A comparative study with concurrent controls: ▪ Non-randomised, experimental trial ▪ Cohort study ▪ Case-control study ▪ Interrupted time series with a control group	A comparison with reference standard that does not meet the criteria required for level II and III-1 evidence	Analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial	A retrospective cohort study	A comparative study with concurrent controls: ▪ Non-randomised, experimental trial ▪ Cohort study ▪ Case-control study
III-3	A comparative study without concurrent controls: ▪ Historical control study ▪ Two or more single arm study ▪ Interrupted time series without a parallel control group	Diagnostic case-control study	A retrospective cohort study	A case-control study	A comparative study without concurrent controls: ▪ Historical control study ▪ Two or more single arm study
IV	Case series with either post-test or pre-test/post-test outcomes	Study of diagnostic yield (no reference standard)	Case series, or cohort study of persons at different stages of disease	A cross-sectional study or case series	Case series

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